

16. (Amended) Method for using the microcontact structure according to claim 1 in a surgical procedure, said procedure selected from the group consisting of retinal implantation for a retina implant, intracranial implantation on nerve tissue inside the skull, spinal implantation on nerve tissue of the spinal cord and its surroundings, and implantation on peripheral nerves.

REMARKS

Applicants have carefully reviewed the above identified application in light of the 10 Office Action dated June 19, 2002. Claims 1-2 and 4-16 are now presented for examination. Claims 1-2 and 4-16 have been amended to define still more clearly what Applicants regard as their invention, in terms which distinguish over the art of record, and in particular to overcome the formal rejection. Claim 3 had been cancelled without prejudice or disclaimer of subject matter. The specification has been carefully reviewed 15 and amended as to matters of form, including those kindly pointed out in the Office Action. A Request for Approval of Drawing Changes is submitted herewith.

Claim 1 is the only independent claim.

Claims 1-15 were rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 3,774,618 (Avery). Claims 1-16 were rejected under 35 U.S.C. § 102(e) as anticipated by 20 U.S. Patent 6,368,349 (Wyatt). Claims 1-16 were rejected under 35 U.S.C. § 112, first paragraph, for lack of enabling disclosure, and the specification was objected to on the same ground. Claims were rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

First, cancellation of Claim 3 renders the rejection of that claim moot.

The claims have been carefully reviewed and amended as deemed necessary to ensure that they conform fully to the requirements of Section 112, second paragraph, with special attention to the points raised in paragraph of the Office Action. It is believed that 5 the rejection under Section 112, second paragraph, has been obviated, and its withdrawal is therefore respectfully requested.

As to the rejection under 35 U.S.C. § 112, first paragraph, applicants submit that the revised specification, in light of the acknowledged prior art (e.g., the Stieglitz article referenced at page 1, line 28 of the specification), is now properly enabled for the current 10 claims.

As to the 35 U.S.C. § 102(e) rejection of claims 1-16 as being anticipated by Wyatt, Applicants submit herewith a copy of the translation of the foreign priority document, with a certification of the translator. Accordingly, applicants submit that they have perfected their April 28, 2000 priority date and consequently Wyatt is not a valid 15 prior art reference. As a consequence, the rejections of claims 1-16 relying on Wyatt are now deemed moot.

Applicants will now address the 35 U.S.C. § 102(b) rejection of claims 1-15 as being anticipated by Avery. The present invention as defined by independent claim 1 relates to an implantable microcontact structure for neuroprostheses which contains at 20 least two regions that are movable relative to one another. Further, during the implantation of this device, these regions are moved in a manner to minimize the spatial extent of the device. Still further, the claimed device is capable of assuming at least two positions for attaining a mechanical anchorage.

As understood by Applicants, Avery relates to a device for implantation in a living body for electrical stimulation of a single nerve. Moreover, Avery relates to such a device being “slipped … beneath the nerve” (col. 4, line 11-12) with less difficulty than had been encountered in the prior art (e.g., col. 3, line 28). Accordingly, Avery notes that 5 his device “is flattened prior to insertion, and then, when in place, is allowed to assume its original shape”, that is, an essentially folded shape so that the ends 48 may be secured to each other (referencing Figs. 3 & 4 and col. 4, lines 15-18).

Avery teaches away from the present invention wherein the spatial extent of the device is minimized at the time of implantation (by folding, nesting or rolling as claimed 10 in claim 4). Avery maximizes this distance by flattening his device prior to insertion as his device must encircle the nerve.

Avery clearly fails to teach or suggest the feature of the present invention wherein the spatial extent is minimized. Accordingly, applicants submit that the present invention, as defined by independent claim 1 is patentable over Avery.

15 A review of the other art of record has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as references against Claim 1. Claim 1 is therefore believed patentable over the art of record.

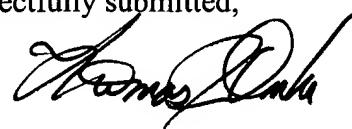
The other claims in this application are each dependent from Claim 1 discussed 20 above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page(s) is/are captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE".

5 Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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MARKED UP VERSION TO SHOW CHANGES MADE

CHANGES TO THE SPECIFICATION:

5 Paragraph Commencing at Page 3, Line 28:

An advantageous device comprising a spatially adaptive microcontact structure for neuroprostheses for implantation at nerve tissue embodies the feature that the microcontact structure can be produced as a planar, two-dimensional structure using current methods for producing microcontact structures (for example on a silicon, silicon 10 or polyimide base (see Figures 1-4)).

In the embodiments depicted in Fig. 1a and 1b a two-dimensional microcontact structure is portrayed. This structure comprises two regions, items 14 and 16, that are foldable about and axis 12. Fig. 1c depicts a simpler embodiment which depicts a microcontact structure which capable of being rolled. Accordingly, these embodiments 15 relate to a microcontact structure that [It] can be folder or rolled very compactly in a second step for transportation purposes in a surgical procedure. Subsequent to its delivery to the implantation point, the structure [and] can not only be unfolded planarly in a third step but may be folded or rolled into a third dimension (See Figures 1-3) so that a three-dimensional structure is produced. By way of example, Fig 2a depicts an 20 embodiment of the invention in which the initial two-dimension microcontact structure contains a gap 20 and notches 22 which permit the structure to be rolled into a three-dimensional object.

Fig. 3 depicts an example in which the folding of regions of the structure (e.g. items 14 and 16) create three dimensional objects at the implantation sites, 30 and 32.

Paragraph Commencing at Page 4, Line 15:

5 An advantageous microcontact structure embodies the feature that on the side adjacent to the nerve tissue after implantation, are provided projecting structures (for example in the form of microelectrodes, sensors, cannulas or nails) that are essential for the mechanical anchorage of the microcontact structure. Fig. 3 depicts an example in which the folding of regions of the structure (e.g. items 14 and 16) create a three dimensional object at the implantation sites, 30 and 32.

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Paragraph Commencing at Page 4, Line 35:

An advantageous transport lock embodies the feature that the microcontact structure is held in the transportation position by a clamp that absorbs the forces or an envelope or pinning. Fig. 1a depicts an example of such a lock feature wherein the folded structure 10 is secured in this position by a clamp 18.

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Paragraph Commencing at Page 6, Line 9:

A further advantageous device of a spatially adaptive microcontact structure 20 embodies the features (as a result of the self-unfolding) that the structure assumes a shape in which it can engage with the tissue of the implantation site as a result of raised microcontacts 34 (see Figure 3).

Paragraph Commencing at Page 6, Line 29:

A further advantageous method embodies the feature that the microcontact structure is based on a substrate of multilayer construction that has so-called memory properties with regard to the spatial arrangement of the microcontact structure. Figure 4 5 shows a section through an advantageous 4-layer microcontact structure in which the active connection between the microcontact structure and the nerve tissue is brought about electrical stimulation.

In the embodiment depicted in Fig. 4a, the [The] layer 42 adjacent to the nerve tissue to be stimulated 40 is composed of [the] a polymer P1 (polyimide) and contains 10 penetrating electrodes 34 made of [the] a metal M such as platinum which also forms the adjoining layer 44. There follows a further layer 46 of the polymer P1 and a top layer 48 of the polymer P2 (polyurethane).

The polymer P2 has the property of a different rate of thermal expansion relative to P1. This property is utilized with an application of infrared radiation (IR) as depicted 15 in Fig. 4b whereby [and the absorption of infrared radiation (IR) so that] a defined volume expansion is brought about by irradiation with IR light.

Paragraph Commencing at Page 7, Line 10:

In this way, the microcontact [film] structure 10 is deformed at defined points by 20 focused irradiation and matched to the shape of the nerve tissue 40. Thus, as depicted in Fig. 4b, the structure 10 has been deformed into a slight curvature to match the curvature of the nerve tissue 40. [Furthermore,] In an additional embodiment depicted in Fig. 4c, the polymer P2 has the property of carrying out structural transitions during

electromagnetic irradiation from the ultraviolet wavelength range, said transitions resulting in contraction of the material. As a result, the formation previously achieved by IR light [or the opposite deformation is compensated] can be compensated for, that is reversed, by means of focused UV treatment so that detachment of the microcontact 5 structure from the nerve tissue [takes place] can be performed. In this way, the re-explanation of the microcontact film is initiated.

We Claim:

1. (Amended) An implantable microcontact structure for neuroprostheses [having a number of] comprising:

5 at least one contact element[s that are], said element formed on at least one two-dimensional carrier wherein the carrier has at least two regions that are movable relative to one another [and that can assume],

10 said microcontact structure capable of assuming at least two desired positions for the purposes of mechanical anchorage, said desired positions comprising [being] a basic position and an operating position, and said microcontact structure having a spatial extent wherein said spatial extent is minimized during surgical transportation to an implant point by compacting the parts that are movable relative on one another.

2. (Amended) The microcontact structure according to Claim 1 further comprising a positioning means wherein the desired positions of the microcontact structure can be 15 fixed, interchanged or altered by external action before [the] implantation, during a surgical intervention or by external signals without surgical intervention.

4. (Amended) The microcontact structure according to Claim [3] 1 wherein the spatial extent of the microcontact structure is minimized during the surgical transportation to the 20 implant point by a minimizing means selected from the group consisting of folding, nesting [or] and rolling.

5. (Amended) The microcontact structure according to Claim [3] 1 wherein said compacting [of the microcontact structure during the surgical transportation] can be released by a releasing means after the surgical transportation [positioning at the implantation point and brought to one of the desired positions for the purpose of 5 mechanical anchorage to nerve tissue].

6. (Amended) The microcontact structure according to Claim [3] 5 wherein said [the] compacting [of] places the microcontact structure in a compact state, and said microcontact structure further comprises a locking means for locking said microcontact 10 structure in the compact state [during the surgical transportation remains locked by a transportation lock until said transportation lock is released by an external intervention].

7. (Amended) The microcontact structure according to Claim 6 further comprising a lock releasing means, said lock releasing means permitting [wherein after releasing the 15 transportation lock, the microcontact structure unfolds or opens out of the compact transportation shape in a controlled movement sequence into a position suitable for mechanical anchorage as a result of] releasing forces at the junctions between the [parts] regions of the microcontact structure to open the microcontact structure out of the compact state.

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8. (Amended) The microcontact structure according to Claim 7 wherein the releasing forces are selected from the group consisting of spring forces, molecular conformation changes pneumatic forces, hydraulic forces and [and/or] electromagnetic forces.

9. (Amended) The microcontact structure according to Claim [1] 2 wherein the [interchange or the alteration of a desired position of the microcontact structure for the purpose of its mechanical anchorage on the nerve tissue] positioning means is utilized to attain a mechanical anchorage and takes place in a measured manner in a time-controlled 5 sequence with respect to movement and force as a result of the external action.

10. (Amended) The microcontact structure according to Claim [1] 2 wherein the [interchange or the alteration of a desired position of the microcontact structure for the purpose of optimizing a] positioning means is utilized to optimize an electrical contact or 10 an active connection with the nerve tissue and takes place in a measured manner in a time-controlled sequence with respect to movement and force as a result of an external action.

11. (Amended) The microcontact structure according to Claim 9 wherein said 15 positioning means comprises [the external action takes place by means of] a surgical device or [by means of] transmitting signals to the microcontact structure.

12. (Amended) The microcontact structure according to Claim 10 wherein said 20 positioning means comprises [the external action takes place by means of] a surgical device or [by means of] transmitting signals to the microcontact structure, in particular [by] electromagnetic signals, light or ultrasound.

13. (Amended) The microcontact structure according to Claim 11 wherein the signals are selected from the group consisting of electromagnetic signals, light [or] and ultrasound.

5 14. (Amended) The microcontact structure according to Claim 12 wherein the signals are selected from the group consisting of electromagnetic signals, light [or] and ultrasound.

10 15. (Amended) The microcontact structure according to Claim 1 wherein the [interchange of the desired positional chosen for the mechanical anchorage of the microcontact structure on the nerve tissue for the purpose of] positioning means is utilized for re-explanation of the structure and said position means takes place in a measured manner in a time-controlled sequence with respect to movement and force by an external action.

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16. (Amended) Method for using [a microcontact structure wherein] the microcontact structure according to claim 1 in a surgical procedure, said procedure selected from the group consisting of [is used for] retinal implantation for a retina implant, [or for] intracranial implantation on nerve tissue inside the skull, [or for] spinal implantation on nerve tissue of the spinal cord and its surroundings, [or for] and implantation on peripheral nerves.

Translator's Notes

Page/para/line

1/2/2 Full stop before "deren" deleted.
1/3/2 Ditto
3/4/1 "dem" should read "den" to agree with "Merkmale" (grammatical error).
3/5/5 Full stop after "können" deleted (not the end of the sentence).
5/2/4 It has been assumed that the word "gehalten" ("held" should be inserted before "wird").
6/2/7 Second "der" is superfluous.

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